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Efficacy and Outcome of Platelet-Rich Plasma (PRP) in Acne Scars; A Tertiary Care Hospital Experience

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Abstract:

Background: *Acne, a widespread skin issue affecting millions globally, not only poses immediate skin health challenges but also results in enduring acne scars, impacting self-esteem and life quality. Platelet-rich plasma (PRP) has emerged as an innovative treatment to address these scars, offering a regenerative approach. Acne, also known as acne vulgaris, is a chronic skin condition due to clogged hair follicles by oil and dead skin cells, leading to various lesions. While its severity varies, many suffer from acne scars, which can harm self-confidence and mental health. PRP, derived from the patient's blood, contains growth factors, making it a promising solution for scar repair. Numerous studies support its effectiveness, but proper technique and patient selection are crucial for optimal results.*

Aim of the Study: *The study aims to determine the efficacy and outcome of Platelet-Rich Plasma (PRP) in acne scars at a tertiary care hospital in Dhaka, Bangladesh.*

Methods: *This study took place at the Department of Dermatology, Holy Family Red Crescent Medical College Hospital in Dhaka, Bangladesh. The research included 26 participants with acne scars in Grades 2 and 3, who were categorized under Fitzpatrick Skin Types IV and V. The study duration was one year from January 2021 to December 2021 and involved obtaining written consent from participants to ensure data confidentiality.*

Result: *In a prospective study with 26 patients, the majority were females (61.54%), while 38.46% were males. Most patients had severe acne scars (42.31%), followed by moderate (30.77%) and hyperplastic scarring (26.92%). Initially, 84.62% were categorized as grade 3 in global acne scar grading, which improved post-treatment, with 65.38% classified as grade 2. Patient satisfaction showed 53.85% with very good improvement and 46.15% with good improvement. Physician satisfaction indicated that 57.69% achieved very good improvement, 30.77% had good improvement, and 11.54% demonstrated excellent improvement.*

Conclusion: *This study demonstrates the promising efficacy of Platelet-Rich Plasma (PRP) in the treatment of acne scars within a tertiary care hospital setting. PRP therapy offers a safe and effective solution, improving the appearance and texture of scars. Further research is warranted to optimize its application and long-term benefits.*

Keywords: *Efficacy, Outcome, Platelet-Rich Plasma (PRP), Acne Scars and Tertiary Care.*

1. INTRODUCTION

Acne, a common dermatological condition affecting millions of individuals worldwide, not only presents immediate challenges in skin health but can also leave enduring marks in the form of acne scars. The presence of these scars can significantly influence a person's self-esteem and overall well-being, leading to an ongoing search for viable treatments that can make a positive difference. Among the innovative therapeutic approaches, Platelet-Rich Plasma (PRP) has emerged as a promising solution, offering a regenerative system to address the challenge of acne scars [1]. Acne is a complex skin condition influenced by various

factors, manifesting through the development of comedowns, papules, pustules, and cysts. These manifestations include both inflammatory and non-inflammatory lesions. Acne vulgaris, commonly referred to as acne, is a persistent skin condition characterized by the blockage of hair follicles due to the accumulation of dead skin cells and sebum [2]. Common manifestations of this condition include the presence of blackheads, whiteheads, pimples, oily skin, and the potential for scarring [3,4,5]. It predominantly impacts areas with a higher concentration of oil glands, such as the face, upper chest, and back [6]. While the severity and duration of acne can vary from person to person, a significant proportion of individuals experience acne scarring, which can manifest as atrophic, hypertrophic, or keloid scars. The psychological and emotional burden of acne scarring should not be underestimated, as it can lead to diminished self-confidence and overall quality of life. The outcome may give rise to diminished self-assurance, heightened anxiety, lower self-worth, and, in severe instances, even precipitate feelings of depression or contemplation of suicide [7,8]. Platelet-rich plasma (PRP) has gained attention in dermatology due to its regenerative and healing properties [9]. Platelet-rich plasma (PRP) is obtained from the patient's blood and is rich in platelets, growth factors, and cytokines, with a high concentration of these beneficial components [10]. These bioactive substances have been shown to stimulate tissue repair and regeneration, making PRP an attractive candidate for treating acne scars [11]. The growth factors within PRP promote collagen synthesis, increase vascularization, and enhance tissue remodeling, all critical aspects of scar repair [12]. Numerous studies have explored the efficacy of PRP in treating acne scars. Several clinical trials and case series have reported favorable outcomes, with a reduction in the severity and visibility of scars after PRP therapy [1,12,13]. These studies have employed various techniques for PRP preparation and application, including micro needling, subcision, and direct injection, and have assessed different types of acne scars, such as rolling, icepick, and boxcar scars. While these findings are promising, it is essential to critically evaluate the existing evidence to determine the consistency and robustness of PRP as a treatment modality. In addition to its regenerative potential, PRP therapy offers several advantages, including safety, minimal risk of adverse events, and the absence of allergic reactions since autologous blood is used. Nevertheless, it is crucial to recognize that PRP is not a one-size-fits-all solution, and patient selection, proper technique, and post-procedural care are all integral factors in achieving optimal results. The study aims to determine the efficacy and outcome of Platelet-Rich Plasma (PRP) in acne scars at a tertiary care hospital in Dhaka, Bangladesh.

2. Methodology and Materials

This study is a prospective observational investigation that involved the enrollment and analysis of 26 patients. The research was carried out at the Department of Dermatology, Holy Family Red Crescent Medical College Hospital, Dhaka, Bangladesh. These patients were prospectively recruited for skin cancer screening. The study was conducted over one year, spanning from January 2021 to December 2021. The participants in this study exclusively consisted of individuals with Grade 2 and 3 acne scars and fell within the Fitzpatrick Skin Type IV and V categories. Prior to data collection, each participant provided written consent, and rigorous measures were implemented to ensure the confidentiality of the collected data.

- **Inclusion Criteria:**
  - Patients above 18 years of age.
  - Individuals who experienced facial acne scars that became less noticeable over time due to stretching.
  - The scars had been present for a duration of 3 to 8 years.
- **Exclusion Criteria:**
  - Individuals with a medical background involving bleeding disorders or those who are currently taking anticoagulant medication.
  - People with a hemoglobin level below 10 grams per deciliter (g/dl).
  - Those with a platelet count lower than 105 per microliter (µL).
  - Persons exhibiting active facial acne or any ongoing infection within their body.
  - Individuals prone to developing keloids.
  - Patients currently undergoing cancer chemotherapy.
  - Pregnant or nursing women.
  - Individuals who have used pain relievers within the week leading up to the procedure.

A thorough patient history was meticulously compiled, covering demographic information, medical background, age of symptom onset, frequency and duration of symptoms, presence of post-inflammatory hyper pigmentation, prior treatments, familial medical history, and personal health history. A comprehensive clinical and dermatological assessment was carried out, evaluating the severity of acne scarring using Goodman and Baron's qualitative global acne scarring grading system. Patients were provided with detailed information about the treatment procedure, including the anticipated duration, potential side effects, and prognosis. The treatment, excluding medication and investigation costs, was offered to all patients at no charge.

Patients underwent a series of six Platelet-Rich Plasma (PRP) treatment sessions spaced one month apart. The PRP procedure adhered to standardized parameters for centrifuge spin time and revolutions per minute (RPM) at room temperature, ensuring a minimum fourfold increase in platelet count from the baseline. Before the procedure, written informed consent was obtained, and a comprehensive blood analysis, including baseline platelet count, was conducted using automated machinery. Digital photographs were taken at the start of treatment and before each subsequent session. To read the treatment space, povidone-iodine was administered, and cleansing with a spirit solution followed this. Subsequently, the area was anesthetized using a topical anesthetic cream (a combination of prilocaine 2.5% and lignocaine 2.5%) and applied under occlusion for approximately 45 minutes before the procedure.

PRP Injection:

We initiated the procedure by drawing 20 to 30 milliliters of autologous whole blood from the median cubital vein of each patient. This blood served as the source for creating pure Platelet-Rich Plasma (P-PRP) using a specialized sterile vacutainer tube containing the anticoagulant acid citrate dextrose-A. The preparation of P-PRP involved a two-step manual process utilizing a centrifuge machine. The initial spin at 1000 RPM for 12 minutes at room temperature aimed to separate plasma, containing platelets and white blood cells, from red blood cells (RBCs) that settled at the tube's bottom. Following this, we carefully aspirated the plasma and transferred it to a second tube without anticoagulant for a second spin. The second spin, conducted at 2000 RPM for 5 minutes, resulted in platelet-poor plasma (PPP) in the upper two-thirds and platelet-rich plasma (PRP) in the lower one-third. We discarded PPP and transferred the remaining PRP into a sterile uricol bulb, recording the quantity. The platelet count in PRP was determined using an automated machine, revealing a concentration approximately 4-4.5 times that of the baseline. Before administration, PRP was activated with calcium chloride in a 1:4 ratio.

For intradermal injection into scars on both cheeks, a 30G needle was used with linear threading and fanning technique. The amount of PRP injected varied (1 to 3 ml) based on the number of scars. Post-injection, we applied pressure, an ice pack as needed, and topical antibiotic cream (fusidic acid 2%). Patients underwent follow-ups on the third and seventh days to monitor side effects and assess scar improvement using Goodman and Baron's qualitative acne scar grading system. After six sessions, patients were re-evaluated, and one-month post-treatment assessments were conducted. Patient and physician satisfaction scores were subjectively rated on a scale from zero to four. Data were organized into tables and graphs with accompanying descriptions for clarity. Statistical analysis was performed using the Statistical Package for Social Science (SPSS) software on a Windows platform, expressing parameters in terms of frequency and percentage for continuous and categorical variables.

3. RESULT

In this prospective study, a total of 26 patients were included and assessed. Table 1 displays the age distribution of the study participants, where 12 (46.15%) individuals fell within the 10-24 years age group, and 38.34% of patients were in the 25-29 years age bracket. The study cohort consisted primarily of females (61.54%), while the remaining 38.46% were males (Figure 1). Among the patients, 42.31% had severe acne scars, 30.77% exhibited moderate scars, and 26.92% had hyperplastic acne scarring (Figure 2). Before treatment, the global acne scar grading revealed that the majority of patients (84.62%) were categorized as grade 3, with the remaining 15.38% falling into grade 1 (Table 2). Post-treatment global acne scar grading, as presented in Table 3, indicated that 65.38% of patients were classified as grade 2, while 34.62% remained in grade 3. Table 4 illustrates patient satisfaction, where 14(53.85%) patients

reported very good improvement, and 12(46.15%) experienced good improvement. In terms of physician satisfaction, as shown in Table 5, 15(57.69%) patients achieved very good improvement, 8(30.77%) patients exhibited good improvement, and 3(11.54%) patients demonstrated excellent improvement.

Table1. *Age distribution of the study population (N=26).*

Age group (year)	Frequency (n)	Percentage (%)
18-20	2	7.69
20-24	12	46.15
25-29	10	38.46
30-45	2	7.69
Total	**26**	**100.00**

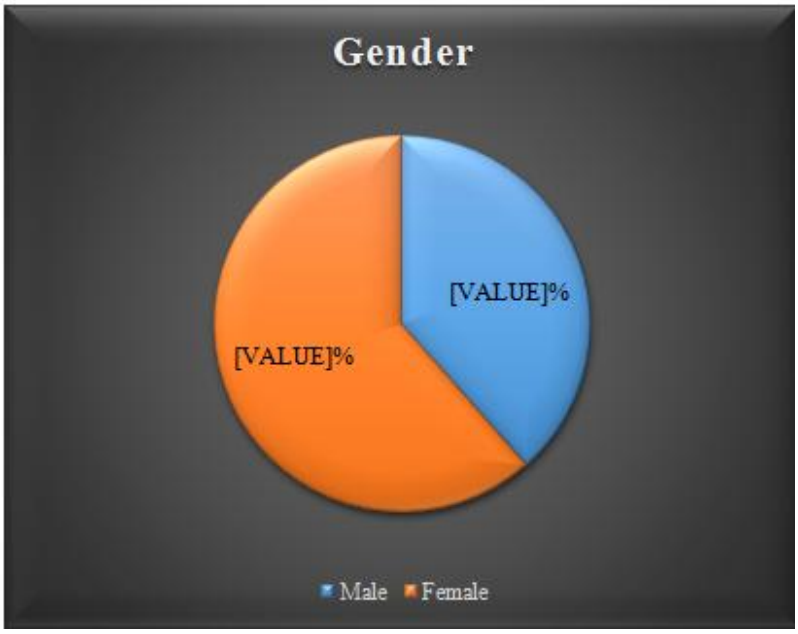

Figure1. *Gender distribution of the study population (N=26).*

Figure2. *Acne scar grading of the study population (N=26).*

Table2. *Global acne scar grading before treatment (N=26).*

Grade	Frequency (n)	Percentage (%)
1	0	0.00
2	4	15.38
3	22	84.62
4	0	0.00
Total	**26**	**100.00**

Table3. *Global acne scar grading after treatment (N=26).*

Grade	Frequency (n)	Percentage (%)
1	0	0.00
2	17	65.38
3	9	34.62
4	0	0.00
Total	**26**	**100.00**

Table4. *Patients satisfaction score.*

Improvement	Frequency (n)	Percentage (%)
Mild improvement	0	0.00
Good improvement	12	46.15
Very good improvement	14	53.85
Excellent improvement	0	0.00
Total	**26**	**100.00**

Table5. *Physician's satisfaction score.*

Improvement	Frequency (n)	Percentage (%)
Mild improvement	0	0.00
Good improvement	8	30.77
Very good improvement	15	57.69
Excellent improvement	3	11.54
Total	**26**	**100.00**

4. DISCUSSION

Acne scarring is a consequence of an unusual healing process triggered by inflammation following damage. This inflammation results from a cell-mediated immune response, and the extent of scarring is associated with the depth and duration of this inflammation. Those with moderate to severe acne scars often experience emotional distress, including anxiety, shame, lack of self-confidence, embarrassment, stress, and impaired social interactions. Employment opportunities may also be compromised, and there have been reports of suicide among acne patients [14]. The importance of prevention over treatment is well-established, making early intervention crucial to avoid scar formation. Various procedures, such as chemical peels, CROSS, subcision, dermabrasion, microdermabrasion, laser resurfacing, punch elevation and excision, skin needling, Platelet-rich plasma (PRP), fillers, and scar excision, are available for treating acne scars. PRP has been used therapeutically in dentistry since 1998 and finds applications in medical fields like cardiac surgery, ophthalmology, oral and maxillofacial surgery, orthopaedic surgery, plastic surgery, sports medicine, and cosmetic medicine [15]. In acne scar treatment, PRP utilizes the body's platelets to stimulate healing, regeneration, and rejuvenation, possibly by activating tissue-resident or bone-marrow-derived stem cells. The technology concentrates platelets and white blood cells from the patient's blood, injecting the solution directly into the injured tissue to trigger the release of growth factors, leveraging the body's natural healing abilities. PRP is notable for its safety, cost-effectiveness, minimal pain (with a numbing cream), and absence of further scarring or damage. Many studies have combined PRP with conventional acne scar treatments, demonstrating its effectiveness alongside other modalities like lasers or dermabrasion. However, limited research exists on the individual impact of PRP as a monotherapy for acne scars. This study aims to explore the unique role of PRP in treating acne scars. Several studies have shown promising results when combining PRP with other treatments. For instance, a study by Jiang Ting Zhu et al. combining Erbium fractional laser with PRP showed over 50% improvement in 90.9% of patients [16]. Lee et al. conducted a split-face trial combining PRP with ablative CO2 fractional resurfacing [17]. Alessio Redaelli et al. demonstrated the effectiveness of PRP alone in face and neck revitalization and scar reduction [18]. A study by Gabriella Fabbrocini et al. showed that combining skin needling with PRP improved acne scars more than skin needling alone [19]. In this study, PRP was directly injected into acne scars, resulting in perfect improvement in 53.85% of patients and a good improvement in 46.15% of patients, according to their satisfaction scores. Physician satisfaction scores aligned with these results, with 57.69% of patients showing perfect improvement, 30.77% showing good

improvement, and 11.54% showing excellent improvement. This finding was consistent with an Indian study by Gulanikad in 2019 [20]. Additionally, Bouwer et al. investigated the effects of PRP mesotherapy in skin rejuvenation and scar attenuation, reporting a 60% improvement in post-acne scars after two PRP sittings, with visible results around six weeks post-procedure [21]. PRP represents an innovative approach to managing atrophic acne scars, offering comparable results to other methods when used as a standalone treatment. Procedures like dermabrasion and ablative lasers have shown similar outcomes but come with the potential risk of pigmentation and scarring.

5. Limitations of the Study

The study "Efficacy and Outcome of Platelet-Rich Plasma (PRP) in Acne Scars; A Tertiary Care Hospital Experience" has limitations. Firstly, its single-center design may not generalize results to broader populations. Additionally, the study's short-term follow-up may not capture long-term outcomes or potential recurrence. The absence of blinding could introduce bias, and the subjective nature of scar assessment may lead to interrater variability. Furthermore, variations in PRP preparation and administration protocols may affect results. Larger, multicenter trials with longer follow-upsare needed to address these limitations.

6. Conclusion and Recommendations

Platelet-rich plasma (PRP) therapy is a straightforward and effective treatment option, offering excellent outcomes while minimizing the risk of side effects. It is particularly well-suited for addressing superficial scars, and the procedure does not disrupt the patient's daily life, as it can be performed on an outpatient basis. The minimal side effects associated with PRP, such as temporary redness (erythema) and swelling (edema), typically resolve within 2 to 6 hours. As such, PRP can be a valuable addition to the arsenal of treatments for superficial acne scars, even as a standalone therapy. However, additional research is needed to standardize the PRP preparation process, account for factors that influence PRP yield, optimize platelet concentration for optimal results, and evaluate the effectiveness of PRP across various scar types.

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